



TRAUMATIC BRAIN INJURY

The Signature Wound of the Iraq War

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EXECUTIVE SUMMARY

Traumatic Brain Injury, or TBI, is the signature wound of the Iraq War. It can be caused by bullets or shrapnel hitting the head or neck, but also by the blast injuries that often result from mortar attacks or roadside bombs. It is this second kind of injury that is especially prevalent in Iraq; about 65% of Iraq and Afghanistan veterans wounded in action were injured by explosive devices. Overall, between 10 and 20% of Iraq veterans, or 150,000 and 300,000 people, have suffered a TBI during the war.

TBI does not always cause an external wound; the pressure of a blast can overstretch or bruise the brain without leaving a visible trace. Moreover, the symptoms of TBI can be difficult to distinguish from combat stress and other related psychological injuries. Telltale signs of TBI include memory and emotional problems; vision, hearing, or speech problems; and sleep disorders. In addition, multiple mild TBIs can accumulate over time, leading to serious neurological problems that are not readily linked to one injury. As a result, TBI can often remain undiagnosed and untreated.

About 90% of TBIs are mild or moderate. But severe TBIs require a lifetime of care and rehabilitation. For the several thousand Iraq and Afghanistan veterans who have suffered this level of injury, the Pentagon and Department of Veterans Affairs have developed a nationwide network of hospitals and clinics. There are four major Polytrauma Rehabilitation Centers, in Tampa, FL, Richmond, VA, Minneapolis, MN, and Palo Alto, CA. These centers are supported by dozens of regional sites across the country.

Although treatment is improving for veterans with severe TBI, TBI screening continues to lag. The Army has improved education for soldiers to help identify the symptoms of a mild TBI, and has begun to test troops' brain activity before their deployments to record baseline data. In spring 2007, the VA began to offer TBI evaluation to all Iraq and Afghanistan veterans seen at a VA hospital or clinic. Until a universal screening program is in place in the military, however, thousands of combat veterans will continue to struggle with the effects of an undiagnosed brain injury.

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INTRODUCTION

Modern body armor and advanced battlefield medicine have made war more survivable for American service members.¹ But many of the most severely injured troops, those who in previous generations would have died from their wounds, are coming home with brain injuries. As a result, Traumatic Brain Injury, or TBI, has become the signature wound of the Iraq War.

TBIs can be the result of penetrating head wounds, such as those caused by a sniper's bullet, or non-penetrating injuries. When troops are too near an exploding mortar or roadside bomb, the blast can damage their brains without leaving a visible injury. It is this second category of injury that has been especially common in Iraq.² TBI can lead to emotional problems; vision, hearing, or speech problems; dizziness; sleep disorders; or memory loss. TBI also increases the risk for other brain disorders, such as Alzheimer's and Parkinson's disease.³

Although the physical effects of TBI are well-documented,⁴ the injury often leaves no external trace.⁵ For troops

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exposed to multiple blasts, TBIs can accumulate, leading to serious neurological problems that are not immediately apparent after the injury. Symptoms such as changes in mood or memory take time to reveal themselves, and are sometimes not easily distinguished from Post-Traumatic Stress Disorder, anxiety or depression. As a result, TBI frequently goes undiagnosed and untreated.⁶

The severity of a traumatic brain injury ranges widely, and is classified based on the length of unconsciousness or amnesia. According to the *New England Journal of Medicine*,⁷ a "mild" TBI causes less than one hour of unconsciousness or 24 hours of amnesia, a "moderate" TBI results in less than one day of unconsciousness or less than 7 days of amnesia, and a "severe" TBI produces more than a day of unconsciousness or more than 7 days of amnesia. About 90% of TBIs are mild or moderate.⁸ In the most severe instances, however, TBI requires a lifetime of care and rehabilitation. Even for mild injuries, the effects of TBI linger in about 15% of cases.⁹

IN PERSON: WENDELL MCLEOD

On July 6, 2005, at the end of a ten-month deployment, Spc. Wendell McLeod sustained multiple injuries to the back and head while serving near the Iraqi border in Kuwait. His memory and mood were severely affected, leaving him unable to perform even simple tasks, like brushing his teeth, unaided. His wife, Annette, has said, "Now I am married to a man I no longer know."

At Walter Reed Army Medical Center, Spc. McLeod's TBI was misdiagnosed as a pre-existing learning disability. It took a year and a Congressional investigation before Spc. McLeod finally received a correct diagnosis, benefits and occupational and speech therapy.

Many other Iraq and Afghanistan veterans are suffering with a misdiagnosed or undiagnosed TBI. Like Wendell McLeod, they cannot get the support they need until their injury is correctly identified.



THE SCOPE OF THE PROBLEM

Traumatic Brain Injury represents a serious threat to troops in Iraq and Afghanistan. Surveys at military bases show that between 10 and 20% of Iraq veterans have suffered a TBI.¹⁰ It is likely, therefore, that between 150,000 and 300,000 of the 1.5 million Americans who have served in Iraq and Afghanistan have brain injuries.

By mid-2007, only about 35,000 troops had been screened for a TBI, however. Of those, approximately 11% tested positive.¹¹ Some troops are more likely to experience concussions,¹² and methods for measuring TBI are not universally accepted, so rates of TBI vary in different studies. At Fort Carson, Colorado, for instance, 17.8% of Iraq veterans screened positive for a TBI.¹³ At Fort Irwin, California, almost 12% of screened troops had suffered a TBI.¹⁴ Of the Fort Carson troops with a TBI, 13% were deemed unfit to return to Iraq.¹⁵

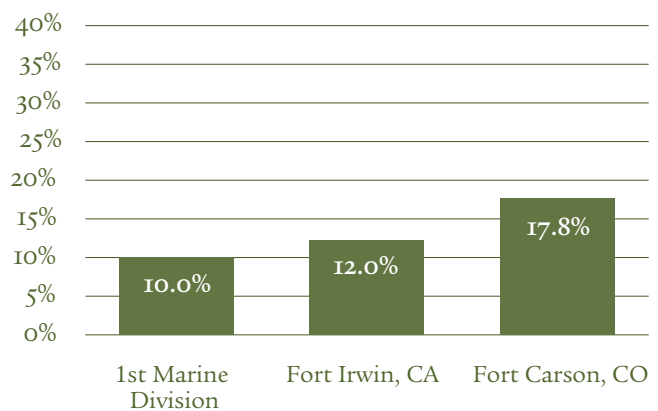
Unsurprisingly, the rate of TBI is much higher among wounded troops. At Landstuhl Medical Center in Germany, the first-stop hospital for war-wounded evacuees of Iraq and Afghanistan, 23% of patients screened for a TBI tested positive.¹⁶ At Walter Reed Army Medical Center in Washington, D.C., 30% of wounded troops have some level of TBI.¹⁷

Only a fraction of troops who have suffered a brain injury are referred to long-term treatment, however. Over 2,600 Iraq and Afghanistan veterans with severe brain injuries are being tracked by the Defense and Veterans Brain Injury Center, the multisite program that researches and treats troops' and veterans' TBI.¹⁸

AT WALTER REED ARMY MEDICAL CENTER IN WASHINGTON, D.C., 30% OF WOUNDED TROOPS HAVE SOME LEVEL OF TBI.

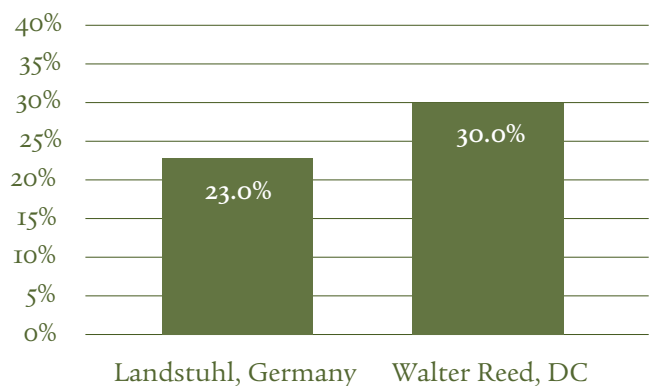
BETWEEN 150,000 AND 300,000 OF THE 1.5 MILLION AMERICANS WHO HAVE SERVED IN IRAQ AND AFGHANISTAN HAVE BRAIN INJURIES.

Prevalence of TBI in the Military



Of the 35,000 troops who had been tested for TBI, about 11% tested positive, but the numbers vary. Note: 7,909 troops were tested in the 1st Marine Division, 1,490 troops were tested at Ft. Irwin, and 13,400 troops were tested at Ft. Carson. Sources: Medical Research and Materiel Command Public Affairs,¹¹ Denver Post,¹³ and Blinded Veterans Association.¹⁴

Prevalence of TBI Among Wounded



The most severely wounded troops, like those at military hospitals such as Landstuhl and Walter Reed, have high rates of Traumatic Brain Injury.

THE RESPONSE TO TBI

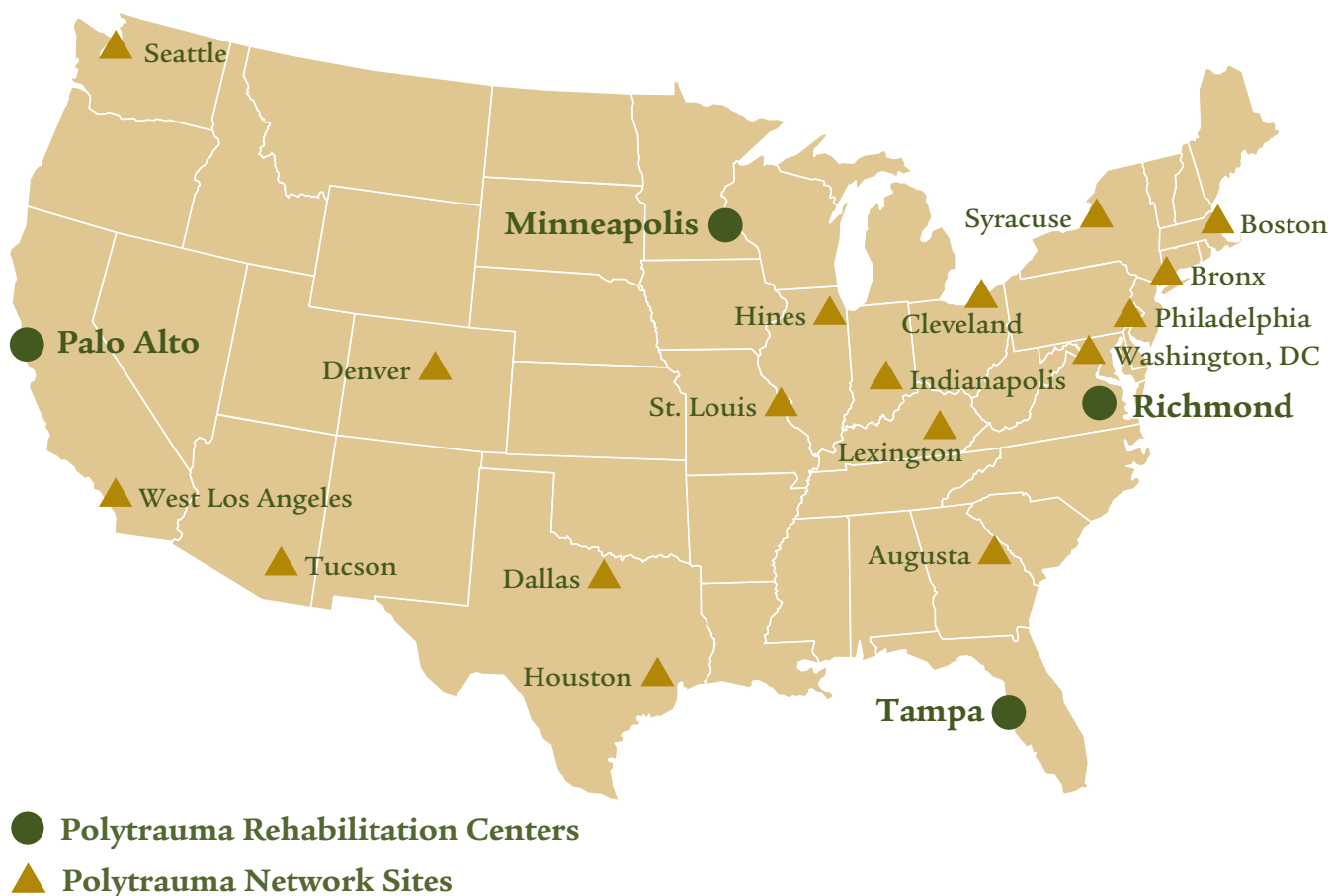
A ground-breaking February 2007 documentary by ABC news anchor Bob Woodruff, who himself suffered a severe brain injury in a bomb blast in Iraq, dramatically increased public awareness of TBI.¹⁹ But in the first years of the war, Washington was slow to respond to the needs of troops with brain injuries. In fact, the FY2007 defense appropriations bill contained just \$7 million, half of what was allocated the year before, for the Defense and Veterans Brain Injury Center (DVBIC). IAVA worked with Congress to protect DVBIC from budget cuts, and helped secure budget increases for the center in FY2008 appropriations.

In 2007, the military and the VA made efforts to improve screening for TBI. The Army has instituted a mandatory education program aimed at helping soldiers identify the symptoms of a mild TBI,²⁰ and is conducting a pilot program to test troops' brain activity before their deployments to record baseline data.²¹ Landstuhl Medical Center is hiring new employees for a TBI treatment center.²² In spring 2007, the VA put in place a TBI evaluation for all Iraq and Afghanistan veterans seen at any VA hospital or clinic.²³ Though only one-third of

Iraq and Afghanistan veterans go to the VA for care, this is a major step towards properly diagnosing and treating TBI. But the accuracy of the VA's testing process has been called into question. Early numbers suggest that nearly 20% of troops are screening positive for TBI symptoms, but only 6% are actually receiving a TBI diagnosis. This number is far lower than that predicted by brain injury experts.²⁴

For troops with severe injuries that require intensive care and rehabilitation, the Pentagon and Department of Veterans Affairs run four major Polytrauma Rehabilitation Centers, in Tampa, FL, Richmond, VA, Minneapolis, MN, and Palo Alto, CA.²⁵ The Centers use teams of physicians and specialists that administer individually tailored rehabilitation plans,²⁶ including full-spectrum TBI care.²⁷ The Centers are also part of the Defense and Veterans Brain Injury Center network.

The Centers are supported by regional network sites across the country.²⁸ The VA is also planning to add new Polytrauma Support Clinics to provide follow-up services for those who no longer require inpatient care but still need rehabilitation.²⁹



Are Psychologically Wounded Troops Getting Discharged Without Benefits?

Personality disorder discharges have increased 40% in the Army since the invasion of Iraq.³⁰ Since 2001, 22,000 troops³¹ have been discharged from the military with a ‘personality disorder.’ In some of these cases, the service member may have had PTSD, TBI, or another combat-related mental health problem, but felt “pressured by commanders and peers to accept an administrative discharge”³² rather than continue to fight for a medical discharge.

According to Representative Bob Filner, Chairman of the Veterans’ Affairs Committee, “My concern is that this country is regressing and again ignoring the legitimate claims of PTSD in favor of the time and money saving diagnosis of Personality Disorder.”³³ The Government Accountability Office is currently investigating reports of inaccurate diagnoses at Fort Carson, CO.³⁴

CONCLUSION

Traumatic Brain Injury is one of the signature wounds of the Iraq war, affecting hundreds of thousands of Iraq and Afghanistan veterans. While the wound can be invisible, its effects are significant; memory loss, sensory problems, and emotional instability are frequent results of severe brain trauma. The VA has instituted mandatory TBI screening of all returning combat veterans visiting a VA hospital, but the Department of Defense should make a similar commitment to screening all of our troops for brain injuries, both before and after deployment. In addition, new funding to study the causes, effects, and treatments of Traumatic Brain Injury would benefit hundreds of thousands of combat veterans now struggling with the effects of this little-understood wound of war. For all of IAVA’s recommendations on Traumatic Brain Injury, see our Legislative Agenda, available at www.iava.org/dc.

RECOMMENDED READING AND ONLINE SOURCES

For more information about the mental health effects of war, please see the IAVA Issue Report: “Mental Health Injuries: The Invisible Wound of War.” To learn more about issues with troops and veterans’ health care, consult the IAVA Issue Report, “Battling Red Tape: Veterans Struggle for Care and Benefits.” All IAVA Issue Reports, and more information about our work on behalf of troops with TBI, are available at www.iava.org/dc.

You can also learn more about TBI from the following sources:

- The Defense and Veterans Brain Injury Center:
<http://www.dvbic.org/>.
- The National Institute of Neurological Disorders and Stroke:
<http://www.ninds.nih.gov/disorders/tbi/tbi.htm>.
- The Centers for Disease Control:
<http://www.cdc.gov/ncipc/tbi/TBI.htm>.
- ‘Bob Woodruff: To Iraq and Back’:
<http://abcnews.go.com/WNT/WoodruffReports/>.
- Bob Woodruff Family Fund for Traumatic Brain Injury:
http://www.bobwoodrufffamilyfund.org/about_brain_injury.shtml.
- Susan Okie, “Traumatic Brain Injury in the War Zone,” *New England Journal of Medicine*, May 19, 2005:
<http://content.nejm.org/cgi/reprint/352/20/2043.pdf>.
- Testimony of Tom Zampieri, Director of Government Relations of the Blinded Veterans Association, before United States House of Representatives VA Committee Subcommittee on Health, March 15, 2007:
<http://veterans.house.gov/hearings/Testimony.aspx?TID=4605>.
- Steve Mroz, “Landstuhl tries to get ahead of brain injuries,” *Stars and Stripes*, March 25, 2007:
<http://stripes.com/article.asp?section=104&article=51034&archive=true>.

ENDNOTES

All links are current to date of publication.

¹ “Mortality rates from combat injuries have fallen from 30 percent in World War II to 10 percent in the Iraq and Afghanistan wars. Vietnam had a 24 percent injury mortality rate, and Desert Storm’s rate was 20 percent.” Mary Garrigan, “More Returning War Vets Have Traumatic Brain Injuries,” *Rapid City Journal*, May 19, 2007: <http://www.rapidcityjournal.com/articles/2007/05/19/news/top/doc464e3cc15bf6b355231961.txt>.

² “About 65 percent of the OEF [Operation Enduring Freedom/Afghanistan] and OIF [Operation Iraqi Freedom] servicemembers wounded in action were injured by blasts and fragments from improvised explosive devices, land mines, and other explosive devices.” GAO-06-794R, “VA and DOD Health Care: Efforts to Provide Seamless Transition...” June 30, 2006. “In 2005, the U.S. military reported 10,953 IED attacks, an average of 30 per day.” Xydakis et al. “Tympanic-Membrane Perforation as a Marker of Concussive Brain Injury in Iraq,” *New England Journal of Medicine* Letters to the Editor, August 23, 2007: <http://content.nejm.org/cgi/content/short/357/8/830> In 2006, “more than 11,852 returning wounded had been exposed to blast injuries.” Testimony of Tom Zampieri, Director of Government Relations of the Blinded Veterans Association, before United States House of Representatives VA Committee Subcommittee on Health, March 15, 2007: <http://veterans.house.gov/hearings/Testimony.aspx?TID=4605>.

³ National Institute of Neurological Disorders and Stroke, “Traumatic brain injury: hope through research,” Bethesda (MD): National Institutes of Health; 2002 Feb. NIH Publication No.: 02-158. See: <http://www.cdc.gov/ncipc/factsheets/tbi.htm>.

⁴ There are three common kinds of TBI: diffuse axonal injury (where changing pressure overstretching brain cells), contusion (bruising of the brain), and subdural hemorrhage (the tearing of veins around the brain). Katherine H. Taber, et al. “Blast-Related Traumatic Brain Injury: What is known?” *Journal Neuropsychiatry and Clinical Neurosciences*, Spring 2006.

⁵ “70 % of hidden brain injuries show no symptoms by the time they’re screened by a doctor.” “Take TBI seriously,” *Army Times* opinion, August 13, 2007. However, there is new evidence that ruptured ear drums are closely correlated with TBI, and that TBI injuries may cause measurable brain cell death. “Tympanic-Membrane Perforation as a Marker of Concussive Brain Injury in Iraq,” *New England Journal of Medicine* Letters to the Editor, August 23, 2007: <http://content.nejm.org/cgi/content/short/357/8/830> Gregg Zoroya. “Scientists: Brain injuries from war worse than thought,” *USA Today*, Sept. 23, 2007.

⁶ Department of Veterans Affairs, “Blast Injury: IED’s As The Current Weapon of Choice,” *Operations Iraqi Freedom/Enduring Freedom Review*, 4(1), April 2007, p. 2: http://www1.va.gov/enviroagents/docs/OIF-OEF_Review_April_2007.pdf.

⁷ Susan Okie, “Traumatic Brain Injury in the War Zone,” *New England Journal of Medicine*, May 19, 2005: <http://content.nejm.org/cgi/reprint/352/20/2043.pdf>.

- ⁸ Matthew J. Friedman, MD, PhD, and Paula P. Schnurr, PhD, "PTSD Treatment: Research and Dissemination," National Center for PTSD, p. 9.
- ⁹ Scott Huddleston, "Troops living with brain injury," *San Antonio Express-News*, April 22, 2007: http://www.mysanantonio.com/specials/battlefield/stories/MYSA042207.01A.brain_injury.358194b.html.
- ¹⁰ Erin Emery, "TBI: Hidden Wounds Plague Iraq War Veterans," *Denver Post*, April 16, 2007: http://www.denverpost.com/ci_5675337.
- ¹¹ Karen Fleming-Michael, "Medical screening increases for TBI," Medical Research and Materiel Command Public Affairs, June 21, 2007: http://www.dcmilitary.com/stories/062107/standard_27944.shtml.
- ¹² There is an ongoing study at Fort Bragg, NC, to study paratroopers' brain injuries. Karen Fleming-Michael, "Medical screening increases for TBI," *Medical Research and Materiel Command Public Affairs*, June 21, 2007: http://www.dcmilitary.com/stories/062107/standard_27944.shtml.
- ¹³ Erin Emery, "TBI: Hidden Wounds Plague Iraq War Veterans," *Denver Post*, April 16, 2007: http://www.denverpost.com/ci_5675337.
- ¹⁴ Testimony of Tom Zampieri, Director of Government Relations of the Blinded Veterans Association, before United States House of Representatives VA Committee Subcommittee on Health, March 15, 2007: <http://veterans.house.gov/hearings/Testimony.aspx?TID=4605>.
- ¹⁵ Erin Emery, "TBI: Hidden Wounds Plague Iraq War Veterans," *Denver Post*, April 16, 2007: http://www.denverpost.com/ci_5675337.
- ¹⁶ "Landstuhl Hopes to Start New Brain Trauma Center," *Stars and Stripes*, November 2, 2007. Earlier data showed a higher rate of TBI – 33%. See: Steve Mroz, "Landstuhl tries to get ahead of brain injuries," *Stars and Stripes*, March 25, 2007: <http://stripes.com/article.asp?section=104&article=51034&archive=true>.
- ¹⁷ "Army testing soldiers' brains before deployment," *Associated Press*, September 19, 2007: <http://www.msnbc.msn.com/id/20876109/>.
- ¹⁸ "Army testing soldiers' brains before deployment," *Associated Press*, September 19, 2007: <http://www.msnbc.msn.com/id/20876109/>.
- ¹⁹ In February 2007, Mr. Woodruff returned to ABC News with his first on-air report, "To Iraq and Back: Bob Woodruff Reports." The documentary chronicled his traumatic brain injury and recovery, and the plight of thousands of service members returning from Iraq and Afghanistan with similar injuries: <http://abcnews.go.com/WNT/WoodruffReports/>.
- ²⁰ It also focuses on identifying symptoms of Post-Traumatic Stress Disorder. For more information on the program, visit the Army Behavioral Health Web Site: <http://www.behavioralhealth.army.mil/chainteaching/index.html>. John Kruzel, "Army to Launch Traumatic Brain Injury, PTSD Education Program," *American Forces Press Service*, July 17, 2007: http://www.frontline-news.com/articles/july172007/ptsd_help_71707.php.
- ²¹ "Army testing soldiers' brains before deployment," *Associated Press*, September 19, 2007: <http://www.msnbc.msn.com/id/20876109/>. Kristin Hall, "Army Tests Brains of Deploying Soldiers," *Associated Press*, September 20, 2007: http://www.signonsandiego.com/uniontrib/20070920/news_1n20brain.html.
- ²² "Landstuhl Hopes to Start New Brain Trauma Center," *Stars and Stripes*, November 2, 2007.
- ²³ VA Press Release, "VA Leading the Way in Care for Traumatic Brain Injuries," February 27, 2007: <http://www1.va.gov/opa/pressrel/pressrelease.cfm?id=1302>.
- ²⁴ Rick Maze, "VA says 6 % of combat vets have TBIs," *Army Times*, November 4, 2007.
- ²⁵ Over 350 Iraq and Afghanistan veterans have required in-patient, round-the-clock care at one of the military and VA polytrauma centers. Department of Veterans' Affairs, "VA Polytrauma System of Care: Frequently Asked Questions," April 19, 2007: <http://www.polytrauma.va.gov/faq.asp#FAQ2>.
- ²⁶ Department of Veterans' Affairs, "VA Polytrauma System of Care," April 19, 2007: <http://www.polytrauma.va.gov/index.asp>.
- ²⁷ VA Office of Inspector General, "Healthcare Inspection: Health Status of and Services for Operation Enduring Freedom/Operation Iraqi Freedom Veterans After Traumatic Brain Injury Rehabilitation," June 12, 2006, p. 3: http://www.pdhealth.mil/admin/nlAttachments/DHCC-Uploads/Healthcare_Inspection_OEF-OIF_TBI.pdf.
- ²⁸ For the locations of the Polytrauma Rehabilitation Centers and Network Sites, see <http://www.polytrauma.va.gov/>.
- ²⁹ Department of Veterans' Affairs, "VA Polytrauma System of Care," April 19, 2007: http://www.polytrauma.va.gov/facility_locations.asp?isFlash=1.
- ³⁰ Daniel Zwerdling, "Army Dismissals for Mental Health, Misconduct Rise," NPR, November 19, 2007.
- ³¹ Matthew D. LaPlante, "Were pleas of Marine ignored?" *The Salt Lake Tribune*, December 31, 2006.
- ³² Department of Defense Task Force on Mental Health, "An achievable vision: Report of the Department of Defense Task Force on Mental Health," June 2007, p. 30: <http://www.ha.osd.mil/dhb/mhtf/MHTF-Report-Final.pdf>.
- ³³ United States House of Representatives Committee on Veterans' Affairs, Press Release, "Personality Disorder: A Deliberate Misdiagnosis To Avoid Veterans' Health Care Costs," July 25, 2007: <http://veterans.house.gov/news/PRArticle.aspx?NewsID=111>.
- ³⁴ "Army testing soldiers' brains before deployment," *Associated Press*, September 19, 2007: <http://www.msnbc.msn.com/id/20876109/>.



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